

Research Paper

Development of Narendra Nagar area as an Urban Center as a part of Nagpur City

Jagruti Mahajani

Research Scholar, Department of Geography, B.P.H.E. Society's
Ahmednagar College, Ahmednagar.

Dr. Maya Unde

Professor and Head Department of Geography, B.P.H.E.
Society's Ahmednagar College, Ahmednagar.

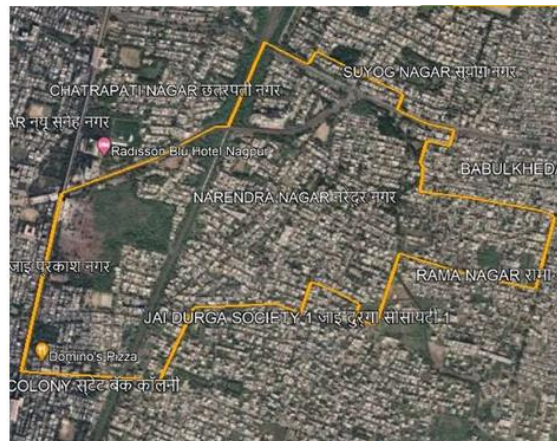
Received 15 Oct., 2023; Revised 29 Oct., 2023; Accepted 31 Oct., 2023 © The author(s) 2023.
Published with open access at www.questjournals.org

I. Introduction

- Urbanization involves an overall set of Social, Economic, Demographic, Cultural, Technological and Environmental processes, that results in the either increase or decrease of population in a particular region or area.
- Urban growth monitoring is the process of studying the differences in the state of an object or phenomenon by remotely observing it at different times. Monitoring results from anthropogenic forces are the result of human modification of the environment (Pilon et al., 1988).
- The Change Detection has become a major application of remote sensing data and Geographic Information System (GIS) or describing changes in land-cover and land-use properties based on co-registered multi-temporal remote sensing data.
- The basic premise in using remote sensing data for change detection is that the process can identify change between two or more dates that is uncharacteristic of normal variation.

Aims & Objectives

- To produce a land use/land cover map for study area that experienced a fast increase of urban land use in last two decades
- To detect changes that have taken place particularly in the built-up land.
- To analyze the temporal urban sprawl.
- To keep an account of added civic amenities and urban facilities.

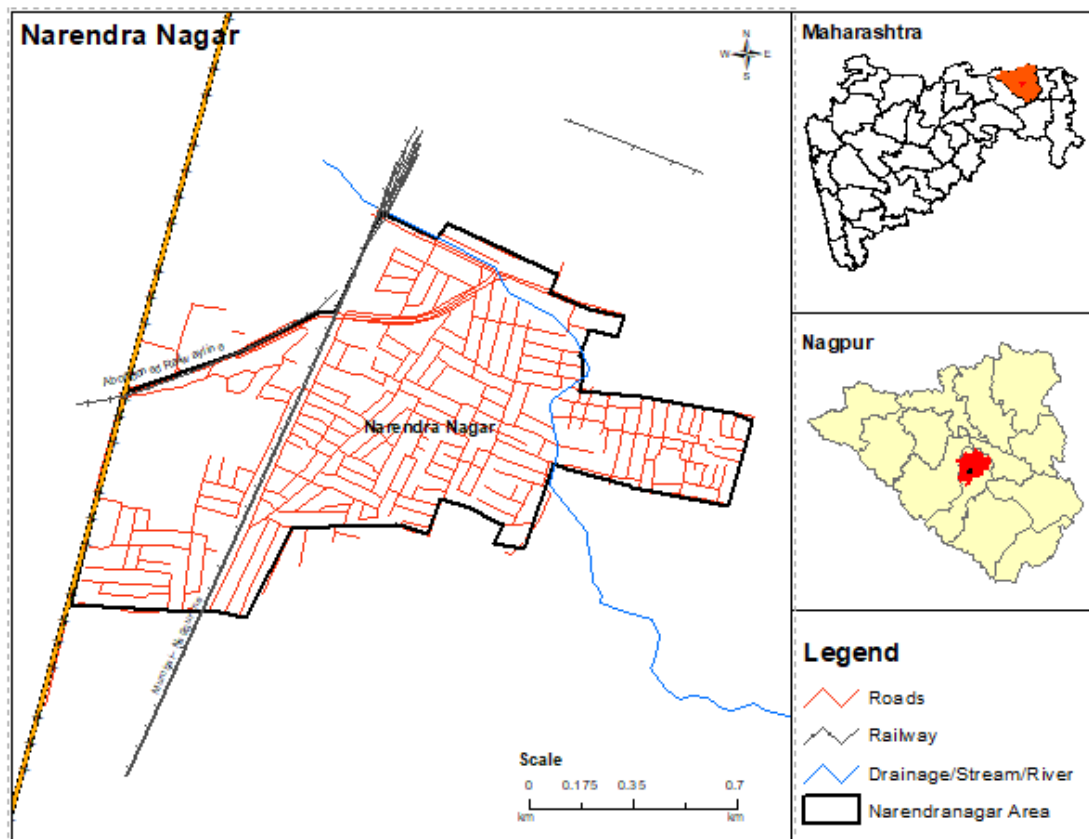


Study Area

- Nagpur city is one of the fastest growing city in terms of development. Narendra Nagar which is situated in the Southwest part of the Nagpur city, experienced a rapid growth in the past 25 years.
- The study area sprawls over **142.94** Hectares and stretches between 21° 6'15.27"N 79° 4'5.68"E; 21° 5'52.67"N 79°4'0.06"E; 21° 6'35.18"N 79° 4'34.03"E & 21° 5'51.01"N 79° 4'17.02 ".
- The growth of settlements in this part of the city is a result of growing population. Located along the NH44 and proximity to Babasaheb Ambedkar International Airport, Jaiprakashnagar Metro station, some prominent software Technology parks and renowned schools have added importance to the growth of Narendra Nagar area.
- The Narendra Nagar area includes colonies viz. Rama nagar, Panchdeep nagar, Modern Society, Sarvetra Nagar, etc.



Location Map

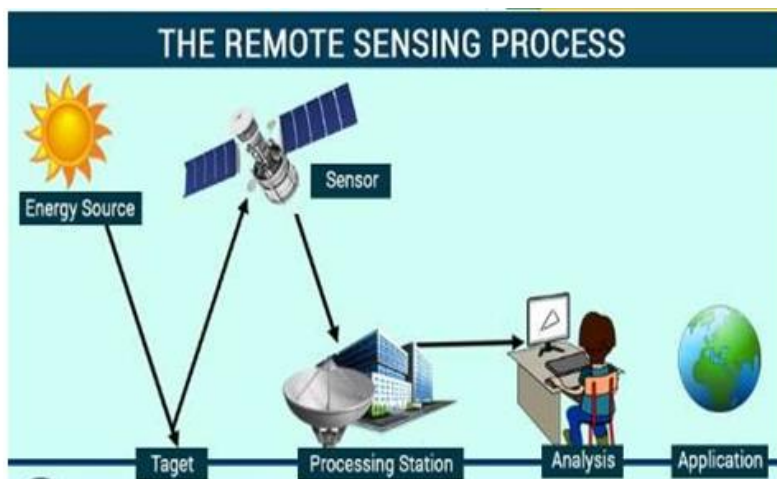


Approach

Remote Sensing

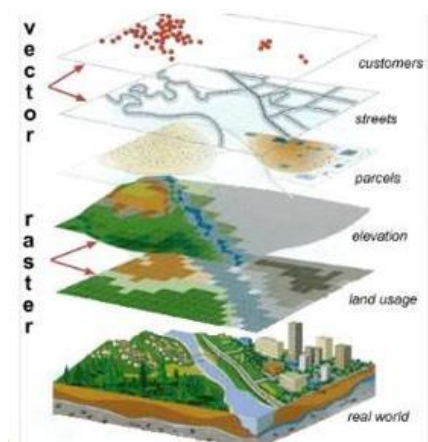
- It is a method of obtaining information about the properties of an object without coming into physical contact with it.
- It captures radiation in different wavelength reflected/emitted by the earth's surface features and transmit back in digital medium used for generating images

- It provides data coverage over vast area in a short time about resources, meteorology and environment leading to better resource management and accelerating national development



Geographic Information System (GIS)

- A Geographic Information System (GIS) is a computer system that analyzes and displays geographically referenced information. It uses data that is attached to a unique location.
- It is used to **store, visualize, analyze, and interpret** geographic data.
- Geographic data (also called spatial, or geospatial data) identifies the geographic



Approach

Change Detection :

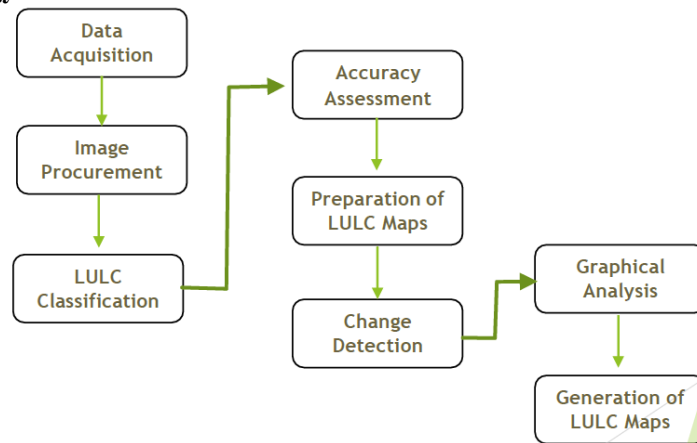
- In geographic information system (GIS), change detection is a process that measures how the attributes of a particular area have changed between two or more time periods.
- Change detection often involves comparing satellite imagery of the area taken at different times.
- Change detection is one of the fundamental applications in imagery and remote sensing. It is the comparison of multiple datasets, typically collected for one area at different times, to determine the type, magnitude, and location of change.

II. Data and methodology

- The present study basically depends upon secondary data sources that involves the topographic sheets from Survey of India and city map from relevant authorities, Open map layers, etc.
- The required satellite imagery for the study area is open access LANDSAT/CNES/Airbus and(Google earth images).
- Processing the imagery and image interpretation for the development of land use/land cover maps is done by using combination of open source GIS softwares.

- Land Use Land Cover (LULC) extraction is done using visual interpretation and normal vectorization methods.
- The obtained maps are studied and analyzed to detect the change in urban sprawl.
- Area is calculated for each LULC for comparison .

Data and Methodology : Flow Chart



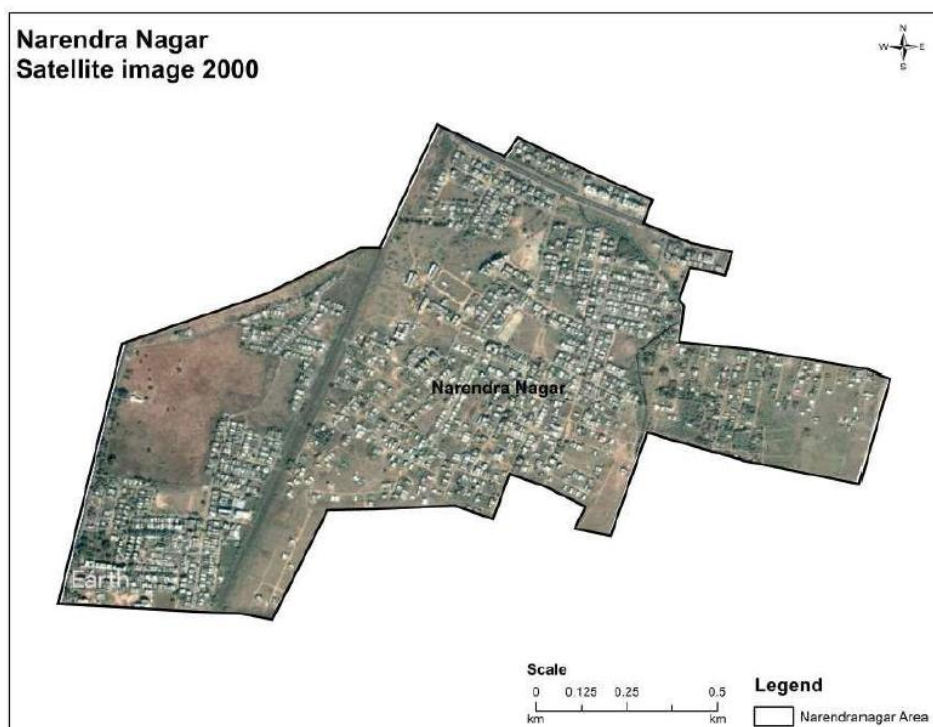
Data and methodology

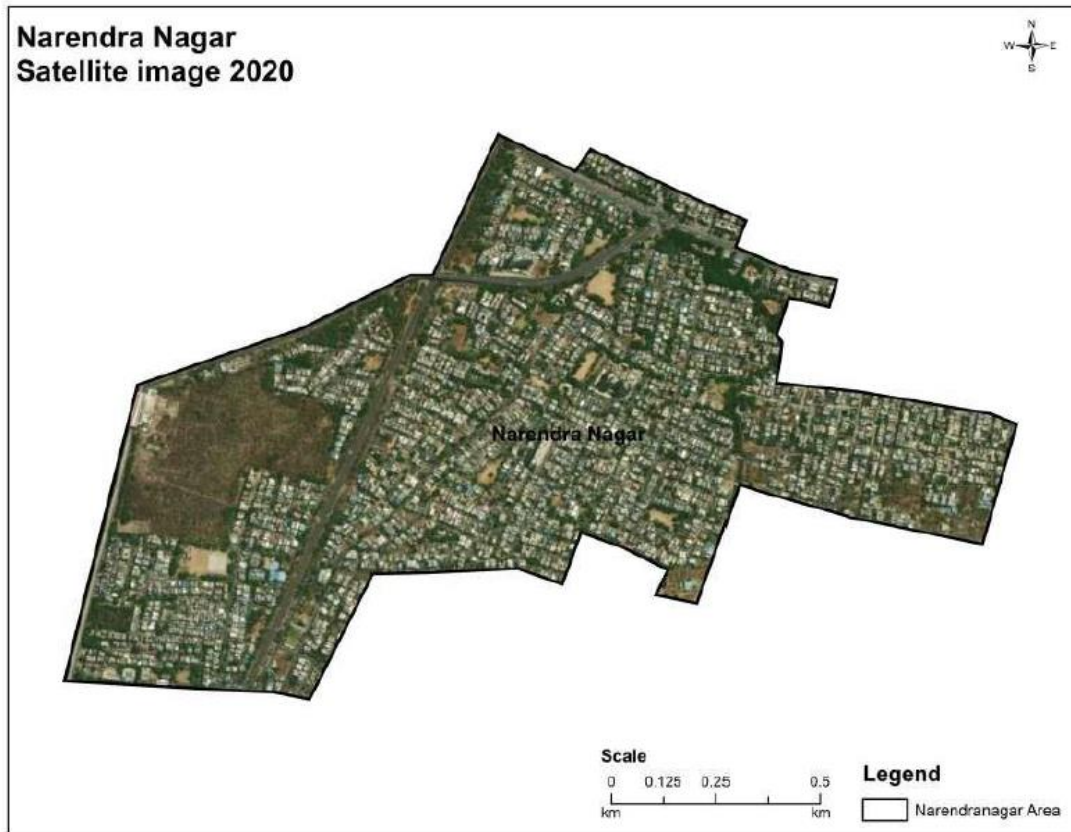
Image Georeferencing

- Digital images that acquired from open source web were georeferenced in GIS environment for the year 2000 and 2020.
- The selected areas were geometrically corrected and calibrated.
- Image enhancement techniques like histogram equalization were performed on each image for improving the image quality.

Data Extraction/Vectorization

- Using visual interpretation techniques, the images were stratified into ‘zones’, where land cover types within a zone have similar spectral properties.
- With the help of digital vectorization tools, the zones in study area has been delineated for year 2000 and 2020 respectively.

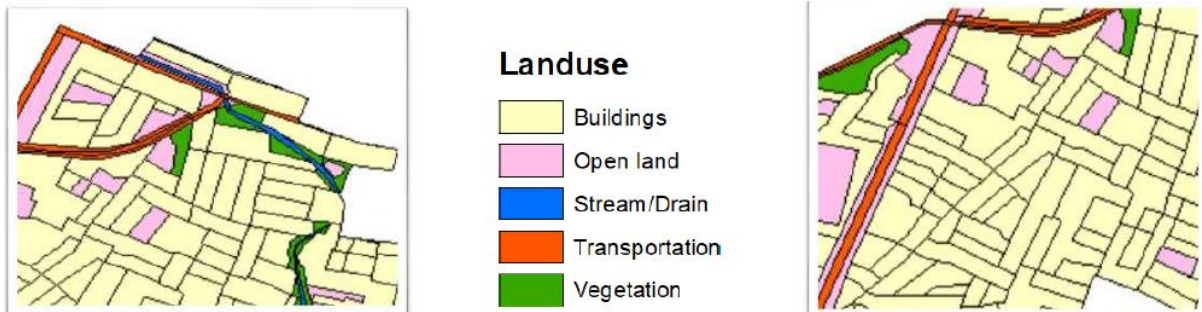


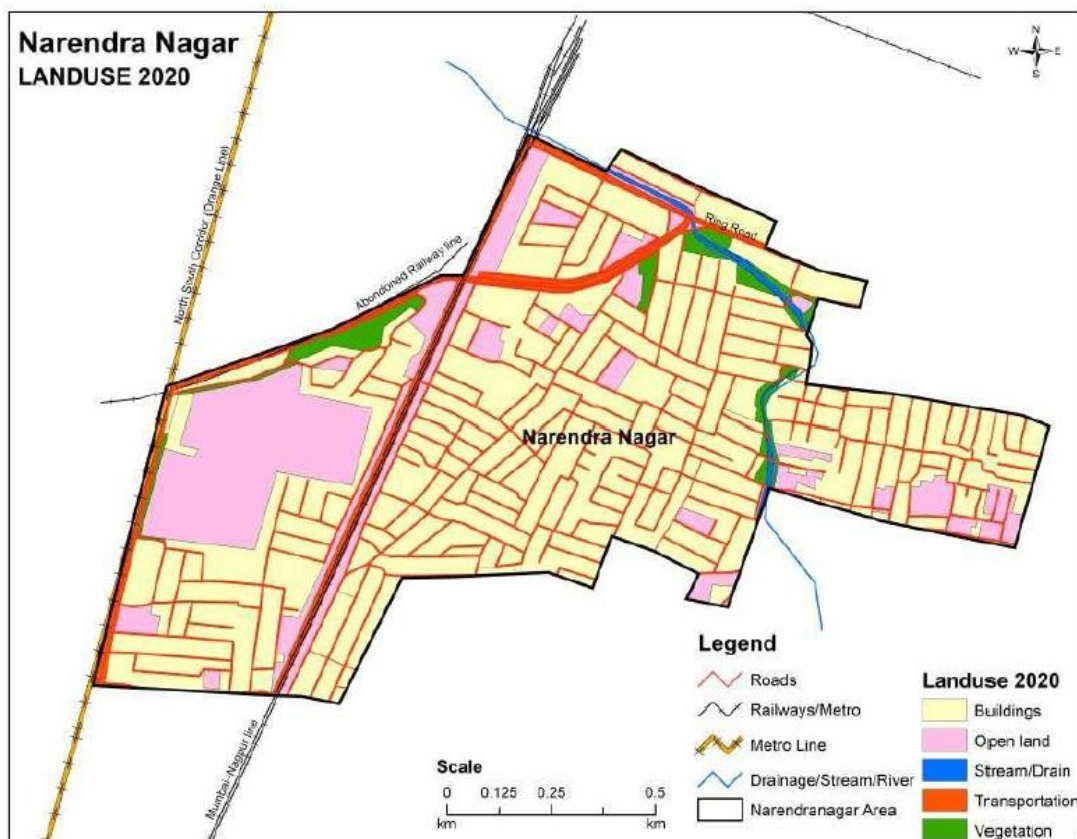
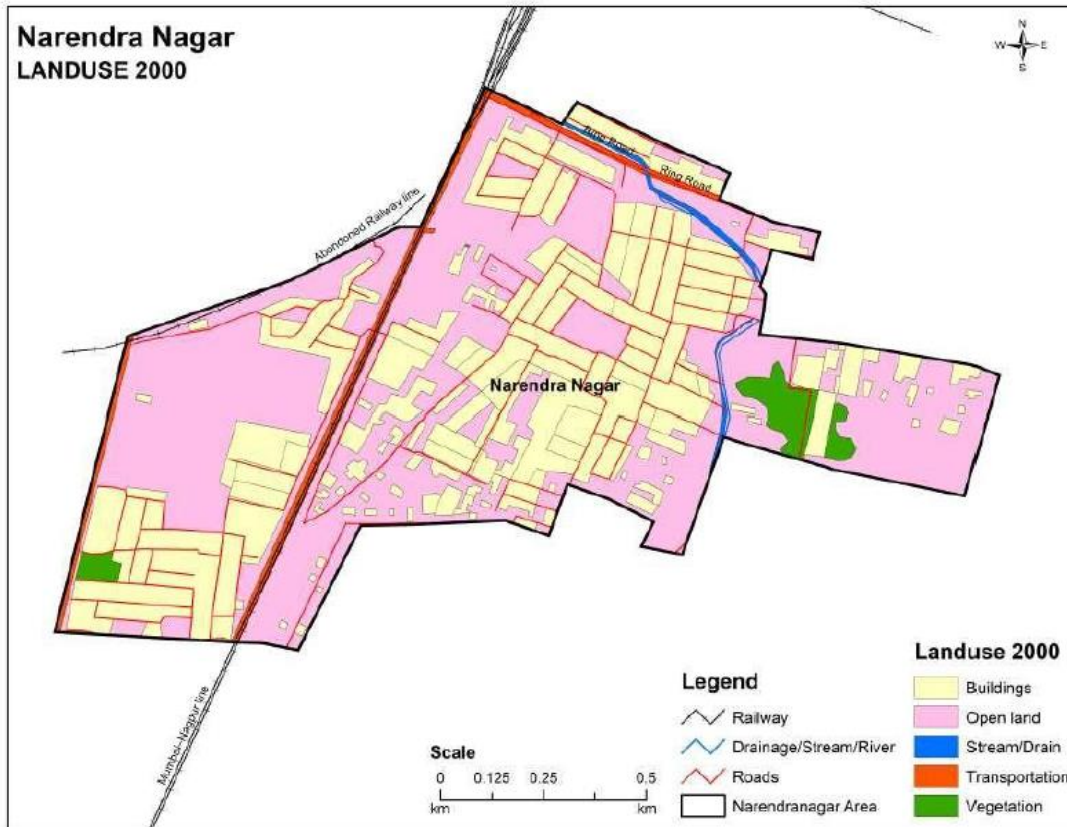


Data and methodology

Land use and land cover

The extracted zones from classified images were attributed in five different classes viz, Buildings, Open land, Stream/Drain, Transportation and Vegetation to understand the land use and land cover of the study area.





Change Detection Analysis

Change detection analysis describe and quantify differences between images of the same scene at different times.

- The classified images of the two dates were used to calculate the area of different land covers and observe the changes that are taking place in the span of data.
- This analysis is very much helpful to identify various changes occurring in different classes of land use like increase in urban built-up area or decrease in open land.

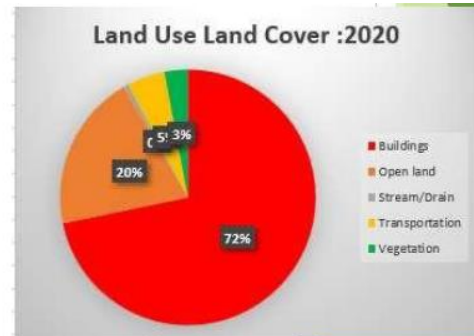
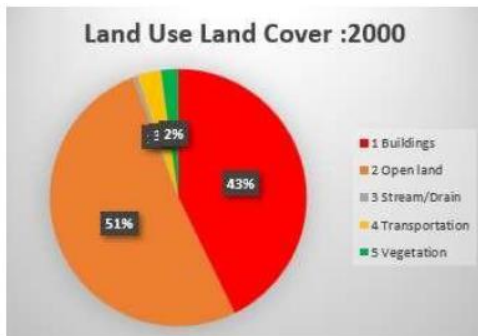
Year 2000		
Sr.	LULC	Area (Hectares)
1	Buildings	61.13
2	Open land	73.60
3	Stream/Drain	0.85
4	Transportation	4.27
5	Vegetation	3.09
	Total	142.94

Year 2020		
Sr.	LULC	Area (Hectares)
1	Buildings	102.56
2	Open land	28.44
3	Stream/Drain	0.85
4	Transportation	6.88
5	Vegetation	4.22
	Total	142.94

Change Detection Analysis

The classified images obtained, show the land use and land cover of the study area.

- These images provide the information about the land use pattern of the study area.
- The red color represents the urban built-up area, dark green color shows the vegetation area, Yellow represents Transportation, blue color shows the water bodies and light brown color shows the open land.

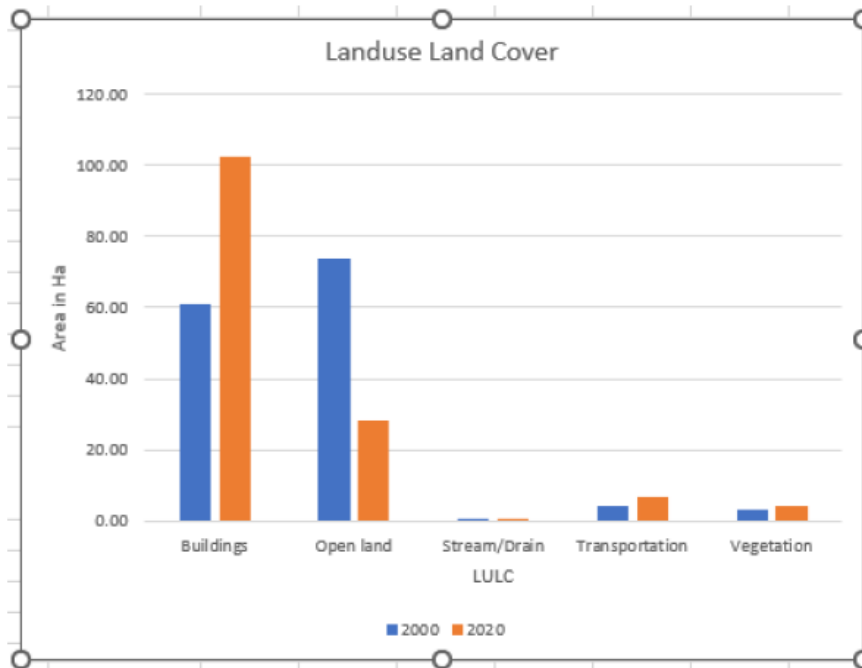


III. Results and discussion

It can be seen that the total investigated area was determined by 142.94 Hectares.

- In the year 2000 built up area covered 61.13 Ha (43%) and open land covered 73.60 Ha. (51%)
- In the year 2020 , built up area is dramatically increased, to cover 102.56 Ha as 72% of the total area, while open land which decreased to 28.43 Ha as 40% of the total area. Water bodies remain constant throughout.

Results and discussion

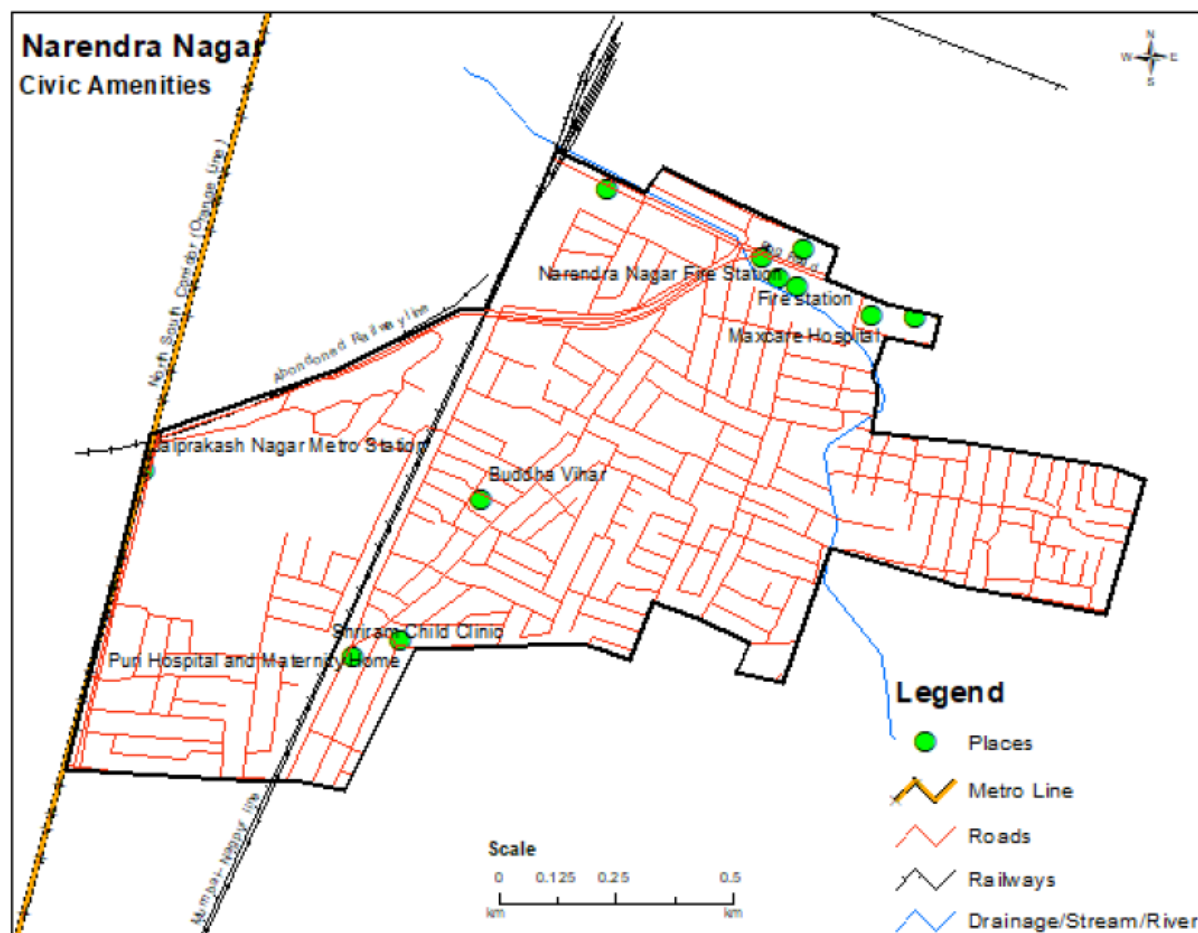


IV. Conclusion

- In this work it is mainly highlighted the urban change detection analysis of Narendra Nagar area of Nagpur city, using remote sensing and GIS techniques.
- The major reason being increase in population.
- With the increase in population, many Civic amenity centers were established in Narendra Nagar in past two decades which mainly includes:
 - ✓ New Roadways
 - ✓ Metro line
 - ✓ Metro Station
 - ✓ Hospitals
 - ✓ Places of worship
 - ✓ Parks
 - ✓ Fire Station

This means that with increase in population, facilities increases, which leads to urbanization.

- Therefore, it is necessary to provide all the facilities to a region, so that an overall development can be experienced



References

Monitoring urban growth and land use change detection with GIS and remote sensing techniques in Daqahlia governorate Egypt – ScienceDirect

Alves and Skole, 1996

D. Alves, D. Skole

Characterizing land cover dynamics using multi-temporal imagery Int. J. Remote Sen., 17 (4) (1996), pp. 835-839

Bell and Hinojosa, 1977

E. Bell, R. Hinojosa

Markov analysis of land use change: continuous time and stationary processes Socio-Econ. Plann. Sci., 11 (1977), pp. 13-17

Sankhala and Singh, 2014

S. Sankhala, B. Singh

Evaluation of urban sprawl and land use land cover change using remote sensing and GIS techniques: a case study of Jaipur City, India

Int. J. Emerging Technol. Adv. Eng., 4 (1) (2014), pp. 66-72

<https://www.slideshare.net/tilokaadi5/change-detection-using-remote-sensing-and-gis>